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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,282	09/26/2006	Hirotsoshi Ishii	295727US0PCT	6171
22850	7590	11/12/2008		
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314				
EXAMINER				
LEE, SIN J				
ART UNIT		PAPER NUMBER		
1795				
NOTIFICATION DATE		DELIVERY MODE		
11/12/2008		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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**Office Action Summary****Application No.**

10/594,282

**Applicant(s)**

ISHII ET AL.

**Examiner**

Sin J. Lee

**Art Unit**

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 August 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 18-23 and 33-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 18-23 and 33-42 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. Claims 1-17, 24-32 are canceled claims.
2. It is to be noted that the effective filing date for present claims 18-23, 33 and 34 is still *April 1, 2005* because present claim 18 as a whole is not supported in the certified English translations of foreign priority documents (specifically, the fifth and the sixth organic groups (-CH(CH<sub>3</sub>)-O-adamantyl) of present claim 18 are not supported in the foreign priority documents. However, the effective filing date for present claims 35-42 is *April 5, 2004* in view of the certified English translation of the Japanese priority document, JP 2004-111460.
3. In view of the amendment, previous 102(b) rejection and 103(a) rejection over Haba et al (Chemistry of Materials, vol.11 No.2, 1999, pg.427-432) are hereby withdrawn.
4. It is to be noted that present claim 33 is not rejected under 35 USC 112, second paragraph because the phrase "by lithography" is considered as an active step of using the photoresist composition of claim 21.
5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

***Claim Rejections - 35 USC § 102***

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claims 35-37 are rejected under 35 U.S.C. 102(b) as being anticipated by Sakamizu et al ("Structural Design of Resin Matrix and Acid-labile Dissolution Inhibitor of Chemical Amplification Positive Electron-beam Resist for Gigabit Lithography", Journal of Photopolymer Science and Technology, vol.11, No. 4 (1998), pg.547-552).

Sakamizu teaches (see pg.548, right hand column) a resist composition containing a dissolution inhibitor (THP-C-[4]-RA (R: 1-tetrahydropyranyl group)) which structure is shown in Figure 1, an acid generator and an alkyl-substituted onium iodide (for acid-diffusion control – thus teaching present quenching agent). The THP-C-[4]-RA, which is a tetrahydropyranyl group-protected calix[4]resorcinarene, teaches present compound of formula (2) of claim 35 (present X, Y and Z being ether bonds, and present B, C and D being 1-tetrahydropyranyl groups). Thus, Sakamizu teaches present photoresist composition of claim 35; since Sakamizu teaches the compound of present formula (2) in claim 35, and since present limitation "... organic compound shown by formula (2), *obtained by washing with an acidic aqueous solution and processing with an ion-exchange resin*" is written in product-by-process claim language, it is the Examiner's position that Sakamizu teaches present compound of formula (2),

obtained by washing with an acidic aqueous solution and processing with an ion-exchange resin. It is also the Examiner's position that since Sakamizu's compound teaches present compound of formula (2), Sakamizu's compound would inherently be in an amorphous state at room temperature and have an average diameter of the molecule ranging 2 nm or less. Thus, Sakamizu teaches present inventions of claims 35-37.

***Claim Rejections - 35 USC § 103***

8. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

9. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sakamizu et al ("Structural Design of Resin Matrix and Acid-labile Dissolution Inhibitor of Chemical Amplification Positive Electron-beam Resist for Gigabit Lithography", Journal of Photopolymer Science and Technology, vol.11, No. 4 (1998), pg.547-552) in view of Aoai et al (5,683,856).

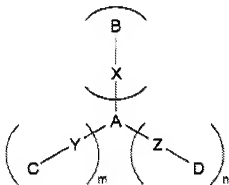
Sakamizu does not explicitly state present basic impurity content. However, it is commonly known in the art that basic impurities tend to deactivate acids generated from photoacid generators thus causing a change in sensitivity and profile or line width of resist pattern as evidenced by Aoai (see col.2, lines 65-67, col.3, lines 2-10). Thus, one skilled in the art would have been motivated to keep the basic impurities content in Sakamizu's composition as low as possible so as to prevent change in sensitivity and profile or line width of resist pattern, and the present range of 10 ppm or less would have been obvious to one skilled in the art at the time the invention was made since it has been held that discovering an optimum value of a result effective variable involves

only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

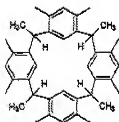
Thus, Sakamizu in view of Aoi render obvious present invention of claim 42.

10. Claim 18-23, 33 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ueda et al (WO 2004/036315 A1) (with US 2005/0271971 A1, which is an English equivalent of the Japanese document, and which is being used here for English translation for the Japanese document).

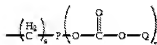
Ueda teaches (see claims 1 and 3 of the Japanese document as well as claims 1, 3 and 4 of the English equivalent) the following compound;



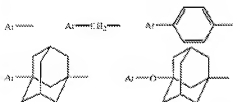
, in which A can be



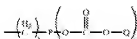
and B, C and D are H atom, tert-butyl, tert-butyloxycarbonylmethyl, tert-butyloxycarbonyl, 1-tetrahydropyranyl, 1-tetrahydrofuranyl, 1-ethoxyethyl, 1-phenoxyethyl, an organic group shown below;



or an organic group represented by

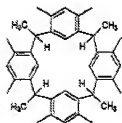


in which Ar is a phenyl or naphthyl group substituted with RO- and/or BOC- in which R is hydrogen, tert-butyl, tert-butyloxycarbonylmethyl, tert-butyloxycarbonyl, 1-tetrahydropyranyl, 1-tetrahydrofuranyl, 1-ethoxyethyl, 1-phenoxyethyl, an organic group represented by



and X, Y and Z are a single bond or an ether bond.

Based on this teaching, it would have been obvious to one skilled in the art to have A to



be

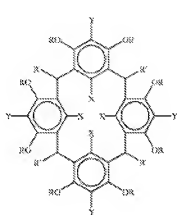
to have B, C and D to be an organic group Ar-CH<sub>2</sub>- in which Ar is a phenyl group substituted with RO- where R is hydrogen and X, Y and Z to be ether bonds with a reasonable expectation of obtaining a photoresist base material for ultrafine processing.

Such compound teaches present compound of claim 18 in which present R is the last organic group shown in the claim. The paragraph [0076] of the English equivalent document states that the compound is washed with an acidic aqueous solution and treated with an ion-exchange resin to be purified. Ueda's compound is used as photoresist base material for extreme UV radiation (see abstract of the English equivalent document). Ueda teaches a photoresist composition containing his compound, a solvent and a photoacid generator (see [0039]-[0040] of the English equivalent). Ueda also teaches that an organic basic compound such as tetrabutylammonium hydroxide can be added to his composition (see [0086] of English equivalent). Ueda uses his composition in lithography steps to manufacture semiconductor devices (see [0090]-[0093] of English equivalent). Thus, Ueda's teaching renders obvious present inventions of claims 18-23, 33 and 34.

11. Claims 35-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al (6,093,517).

Ito teaches (col.5, lines 18-59, col.6, lines 6-13) a lithographic photoresist composition (useful for electron beam or deep UV radiation) containing a calyx[4]resorcinarene (which structure is shown below) that is at least partially protected with a protecting group (see col.4, lines 50-54);





wherein:

the R moieties are independently selected from the group consisting of hydrogen, acid-labile protecting groups, and acid-inert protecting groups, with the proviso that at least one R is a protecting group;

the R' moieties are independently selected from the group consisting of hydrogen, halogen, nitro, alkyl, aryl, and alkaryl, and, if alkyl, aryl or alkaryl, optionally substituted with one to four substituents selected from the group consisting of hydroxy, halogen, lower alkyl, lower alkoxy and nitro; and

the X and Y moieties may be the same or different and are selected from the group consisting of hydrogen, alkyl, alkoxy, alkynyl, alkoxy, aryl, alkyl, alkaryl, halo, cyano, nitro and carboxylate.

Specifically, in Examples 18 and 19, Ito teaches O-Octa-t-butoxycarbonyl (tBOC)-C-tetraphenyl-calix[4] resorcinarene. This compound belongs to the generic formula (I) shown above in which Y's are H atoms, X's are phenyl groups (an aryl group), all of R' are H atoms, and all of R is t-butoxycarbonyl groups (acid-labile protecting groups). Because Ito teaches that X can be *H*, alkyl, alkenyl, alkynyl, alkoxy, *aryl*, aralkyl, alkaryl, halo, cyano, nitro and carboxylate, it would have been obvious to one skilled in the art to replace those 4 phenyl groups with H atoms with a reasonable expectation of success because Ito teaches the equivalence of H atoms and aryl groups for his X groups. Also, because Ito teaches that R' can be *H*, halogen, nitro, *alkyl*, aryl and alkaryl, it would have been obvious to one skilled in the art to replace H atoms in Ito's O-Octa-t-butoxycarbonyl (tBOC)-C-tetraphenyl-calix[4] resorcinarene with an alkyl

group such as methyl group (see col.6, lines 58-60) with a reasonable expectation of success. Therefore, Ito renders obvious present compound of formula (2) (present X, Y and Z being ether bonds and present B, C and D being t-butyloxycarbonyl groups). Ito's photoresist composition also contains a photoacid generator (col.10, lines 58-60, col.12, lines 20-51) as well as acid-diffusion controlling agents (quenching agents). Thus, Ito renders obvious present inventions of claims 35-40; since Ito teaches the compound of present formula (2) in claim 35 and claim 38, and since present limitation "... organic compound shown by formula (2), *obtained by* washing with an acidic aqueous solution and processing with an ion-exchange resin" is written in product-by-process claim language, it is the Examiner's position that Ito teaches present compound of formula (2), obtained by washing with an acidic aqueous solution and processing with an ion-exchange resin. It is also the Examiner's position that since Ito's compound teaches present compound of formula (2), Ito's compound would inherently be in an amorphous state at room temperature and have an average diameter of the molecule ranging 2 nm or less.

With respect to present claim 41, as shown in the formula (I) above, R can be H, acid-labile protecting groups (such as t-butyloxycarbonyl groups) and acid-inert protecting groups (provided that at least one R is a protecting group). Based on this teaching, it would have been obvious to one skilled in the art to replace some of the t-butyloxycarbonyl groups in O-Octa-t-butoxycarbonyl (tBOC)-C-tetraphenyl-calix[4]resorcinarene with H atoms with a reasonable expectation of success because Ito teaches the equivalence of H atoms and acid-labile protecting groups (such as t-

butyloxycarbonyl groups) for R groups. Thus, Ito renders obvious present invention of claim 41.

12. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al (6,093,517) in view of Aoai et al (5,683,856).

Ito does not explicitly state present basic impurity content. However, it is commonly known in the art that basic impurities tend to deactivate acids generated from photoacid generators thus causing a change in sensitivity and profile or line width of resist pattern as evidenced by Aoai (see col.2, lines 65-67, col.3, lines 2-10). Thus, one skilled in the art would have been motivated to keep the basic impurities content in Ito's composition as low as possible so as to prevent change in sensitivity and profile or line width of resist pattern, and the present range of 10 ppm or less would have been obvious to one skilled in the art at the time the invention was made since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Thus, Ito in view of Aoai renders obvious present invention of claim 42.

#### ***Response to Arguments***

13. Applicants argue that Ueda et al (WO'315) is not available as prior art against the claims of present application in view of the English translations of Japanese priority documents. The Examiner believes that such argument is already answered in Paragraph 2 above.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is 571-272-1333.

The examiner can normally be reached on Monday-Friday from 9:00 am EST to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly, can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Sin J. Lee/  
Primary Examiner, Art Unit 1795  
November 3, 2008